SuperGIS Server 3 Website Performance and Stress Test Report

Published by:
SuperGeo Technologies Inc.
RD Team

2010-12-13

Printed in Taiwan, R.O.C.

Disclaimer

THE DATA INCLUDED IN THIS WORK IS FROM AN INDEPENDENT COMPANY AND, AS SUCH, SUPERGEO MAKES NO GUARANTEES AS TO THE QUALITY, COMPLETENESS, AND/OR ACCURACY OF THE DATA. EVERY EFFORT HAS BEEN MADE TO ENSURE THE ACCURACY OF THE DATA INCLUDED IN THIS WORK, BUT THE INFORMATION IS DYNAMIC IN NATURE AND IS SUBJECT TO CHANGE WITHOUT NOTICE. SUPERGEO AND THE DATA VENDOR(S) ARE NOT INVITING RELIANCE OF THE DATA. AND ONE SHOULD ALWAYS VERIFY ACTUAL DATA AND NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SUPERGEO AND THE DATA VENDOR(S) SHAL ASSUME NO LIABILITY FOR INDIRECT, SPECIAL, EXEMPLARY, OR CONSEQUANTIAL DAMAGES, EVEN IF ADVISED OF THE POSSIBILITY THEREOF.

Content

Introduction

In this test report, a series of performance tests on the 2 types of SuperGIS Server 3 websites, Ultra website and Flex website were conducted, and the related recommended specification and methods for enterprises to create a website are provided.

Since a website performance test can be discussed in different dimensions according to various requirements, we simulated a case in this test and applied the case as the standard to test the performance and analyze the results. During the test, we utilized Microsoft Web Application Stress Tool as the performance test tool. Through setting the parameters, we simulated several situations that might occur in manipulation to conduct the tests.

In the following sections, we will introduce the network environment, test software, and the specification of the test computer, size of the map file, etc. which were used in the test. Therefore, you will be able to understand the test more clearly.

Test Environment

1. Introduction to Testing Software

In the test, we used Microsoft Web Application Stress Tool to test the SuperGIS Server 3 website performance and provide the explanation and suggestions based on the test results. Thus, the suggestions can be the references for users to create SuperGIS Server 3 website services.

Microsoft Web Application Stress Tool is the tool to test how the web applications perform. With the tools, we used a labor-saving and cost-effective method to simulate several situations, like multiple browsers connecting to the application and the website processing numerous requests.

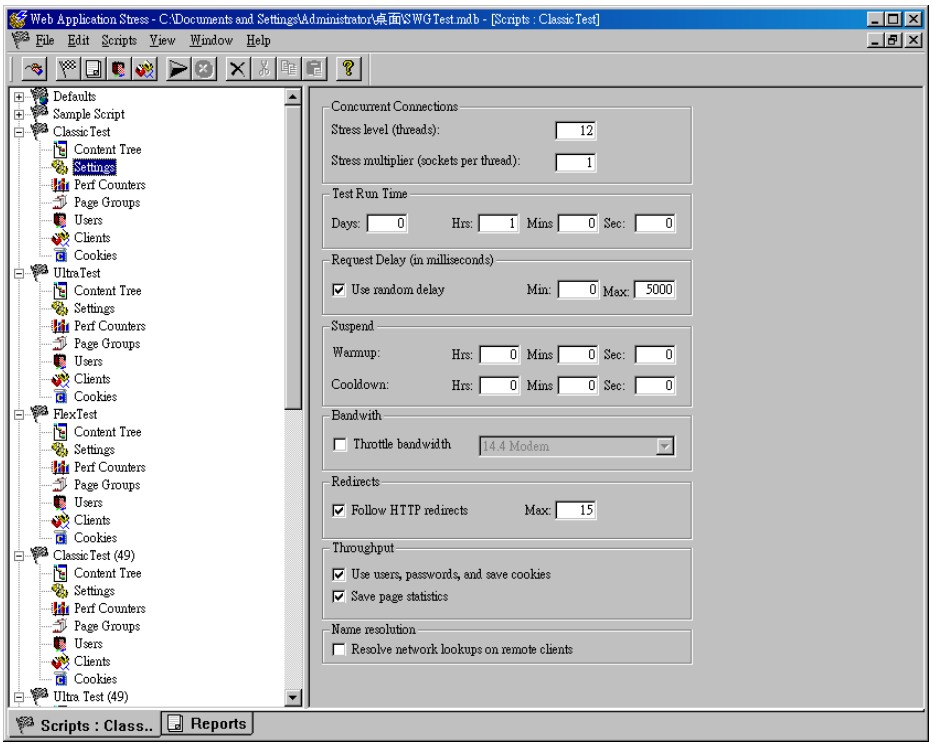


Figure 1 Interface of Microsoft Web Application Stress Tool

2. Testing Hardware Specification

The entire test was conducted in 100Mbps LAN environment; the test applied a client computer to test the website performance in a dual-core server that is in the same local area network. The followings are the specifications of the computers utilized in the test.

- **Specification of server:**

Windows Server 2003 / Dual Core / Intel Pentium(R) 4 CPU 2.60GHz / 1.50GB RAM

- **Specification of client-side computer:**

Windows XP Professional / Single Core / Intel Pentium(R) 4 CPU 2.40GHz / 1.00GB RAM

3. Procedure of Website Performance Test

Before testing the website performance, we applied SuperGIS Server 3 Maintainer on the server to publish the map services that would be used in the test. Moreover, we used SuperGIS Server 3 Designer to create two different types of map service websites (Ultra website and Flex website). Then, we used the simulated client computer to connect to the server of SuperGIS Server 3 in the local network to test the website performance (figure 2).

The test in the report is to simulate front-end users to randomly view the map services on the website via Internet Explorer. Then, the response time taken to process and transfer the client side request in Ultra website and Flex website are recorded respectively; the recorded data are the essential reference for developers who develop SuperGIS Server 3 websites. The test is conducted with Microsoft Web Application Stress Tool script; we also adjust the testing parameters in Microsoft Web Application Stress Tool to know how each type of SuperGIS Server 3 website performs in different situations.

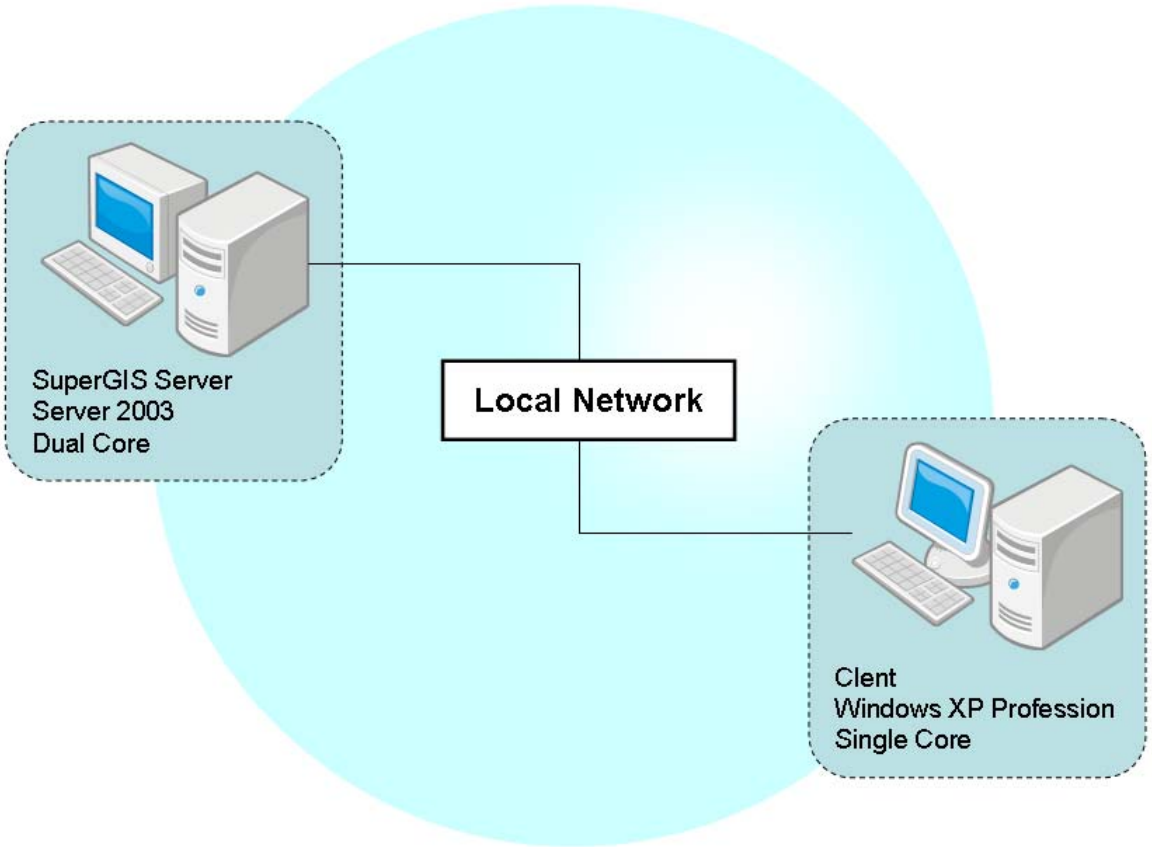


Figure 2

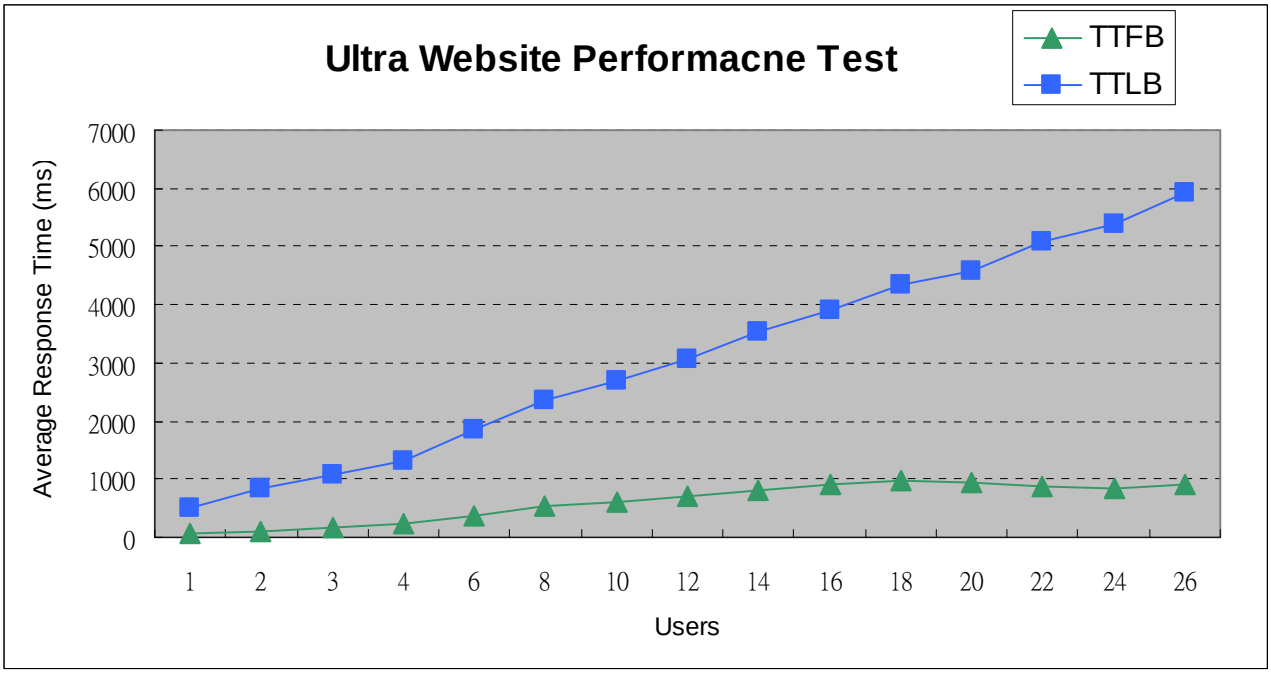
Results of Website Performance and Stress Test

1. Ultra Website

SuperGIS Server 3 Ultra website is the website template based on JavaScript and map caching technology and enables developers who may have little experience of developing to create a high-efficient GIS website. The structure of Ultra website applies ASP.NET webpage to communicate with ActiveX COM objects and website server, and the website generates map caches by clipping and mosaicing images. Then, map caches will be placed together and displayed on the front side. The unique processing method can greatly save the processing time and resources for Ultra website, significantly reduce the burden of the server, and considerably improve the visual presentation and manipulation of the website.

Before testing the performance of Ultra website, we need to set testing standards. Based on the standards, we can check how the website performs when multiple users view the 350-mb map service in the dual-core CPU server of SuperGIS Server 3 and check if the map caching mechanism does improve the performance of the website.

- Standard 1: In 100.0Mbps local network, the average response time for multiple users viewing the SuperGIS Server 3 Ultra website which displays 24 cached images simultaneously is less than 3 seconds



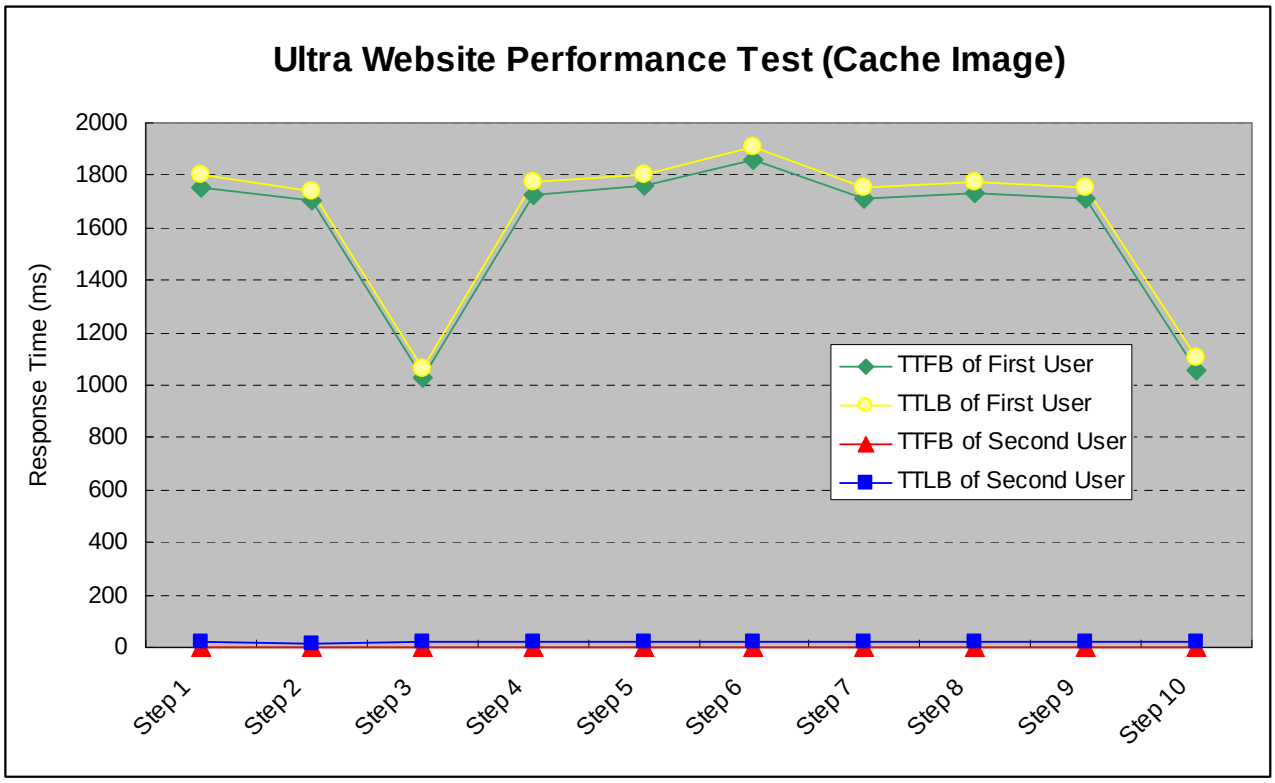
TTFB: The time client side receives the first bit responded by the server

TTLB: The time client side receives the last bit responded by the server.

By reading the chart, we can find that when 12 users view the Ultra website established in dual-core CPU environment at the same time, the average response time starts to be more than 3.00 seconds (TTFB is about 3.07 seconds). Therefore, it is estimated that if you want the SuperGIS Server 3 Ultra website to perform the best, the recommended number of users is around 12.

- Standard 2: In 100.0Mbs local network, we browsed the Ultra website for 10 times to test whether the response time would be different to display single clip image (256pix × 256pix) with cache and without cache.

In the test, we would like to know if the first user views the image on the website without any cache, and then the second user views the same image right away, how long the two users spend receiving the responses. Moreover, we applied Stress Tool to record the two users' response time in browsing the website to analyze the performance difference between with and without cache.

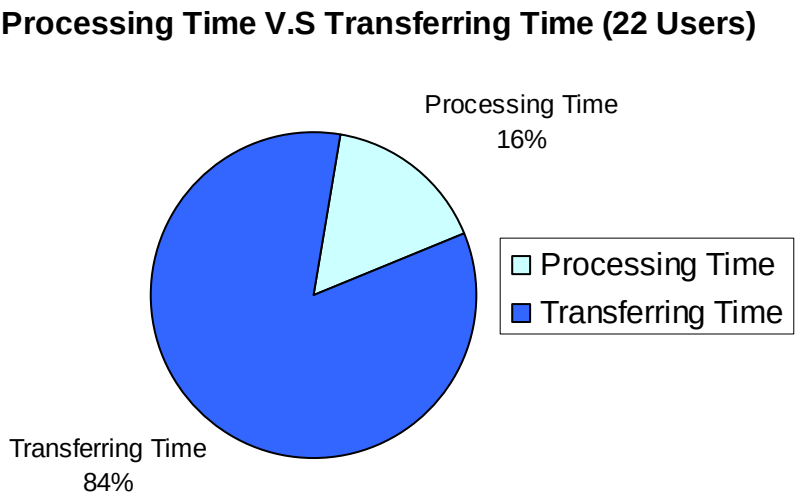


TTFB: The time client side receives the first bit responded by the server

TTLB: The time client side receives the last bit responded by the server.

The chart above shows that the response time difference between the two users browsing the same image is more than 1.70 seconds. If the 24 images are displayed at the same time, the time difference might be longer than 40.80 seconds.

Additionally, when there was no cached image, in the system response time, the processing time was much longer than the transferring time. Take Step 3 in the chart above for example, as the first user viewed the Ultra website, the server takes 1024.69 milliseconds (TTFB) to process the maps but only took 38.85 milliseconds (TTLB-TTFB) to transfer the map. However, you can find that when the second user viewed the website with cached images, the time for processing maps was significantly reduced; the average time was 3.24 milliseconds. Transferring cached images was also much more quickly than non-cached images; it only took 17.49 milliseconds to transfer cached images. Therefore, we can infer that the map caching mechanism of Ultra website does improve the operation capability of the website.



Furthermore, the figures in the test indicate that most of the time taken by the Ultra website to respond client request is transferring time rather than processing time. Like the chart above, there were 22 concurrent users viewing the Ultra website; processing time possesses 16% of the time taken by the website to respond requests from clients but transferring time possesses 84%. The percentage of the processing time and transferring time might be varied because of internet transfer speed and IIS operation capability. Consequently, we can know that if we want to significantly improve the website performance, besides map caching technology, improving internet transfer speed and IIS operation capability is another issue which should be considered.

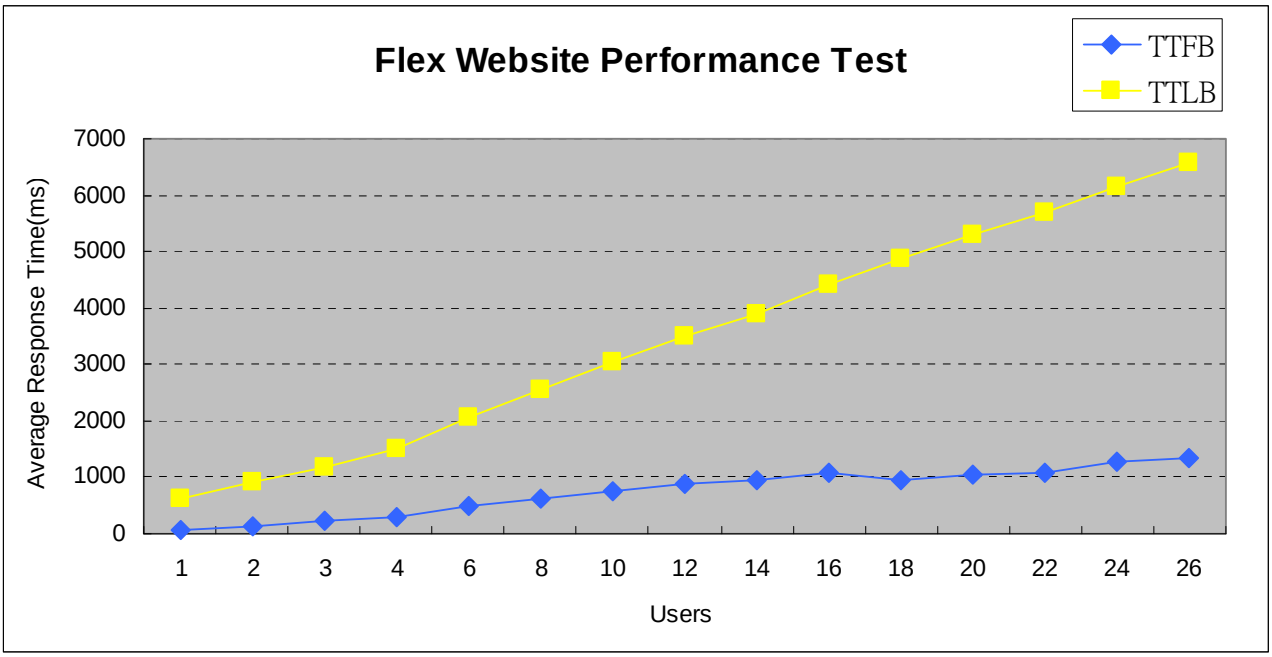
2. Flex Website

Flex website, the website template based on Flash framework, is able to help developers to rapidly establish a dynamic website with Flash effects. Basically, the operation structure of Flex website is similar to Ultra website; both of Flex website and Ultra website utilize ASP.NET to connect to the website server through ActiveX COM components and generate map cache by clipping and mosaicing images. Then, the map caches will be placed together and displayed on the front end. As a result, Flex website can perform as good as Ultra website.

The method to test Flex website is the same as Ultra website. We also need to set

standards for the test. Based on the standards, we can check how the website performs when multiple users view the 350-mb map service in the dual-core CPU environment and check if the map caching mechanism does improve the performance of the website.

- Standard 1: In 100.0Mbps local network, the average response time for multiple users viewing the SuperGIS Server 3 Flex website which displays 24 cached images simultaneously takes less than 3 seconds.



TTFB: The time client side receives the first bit responded by the server

TTLB: The time client side receives the last bit responded by the server.

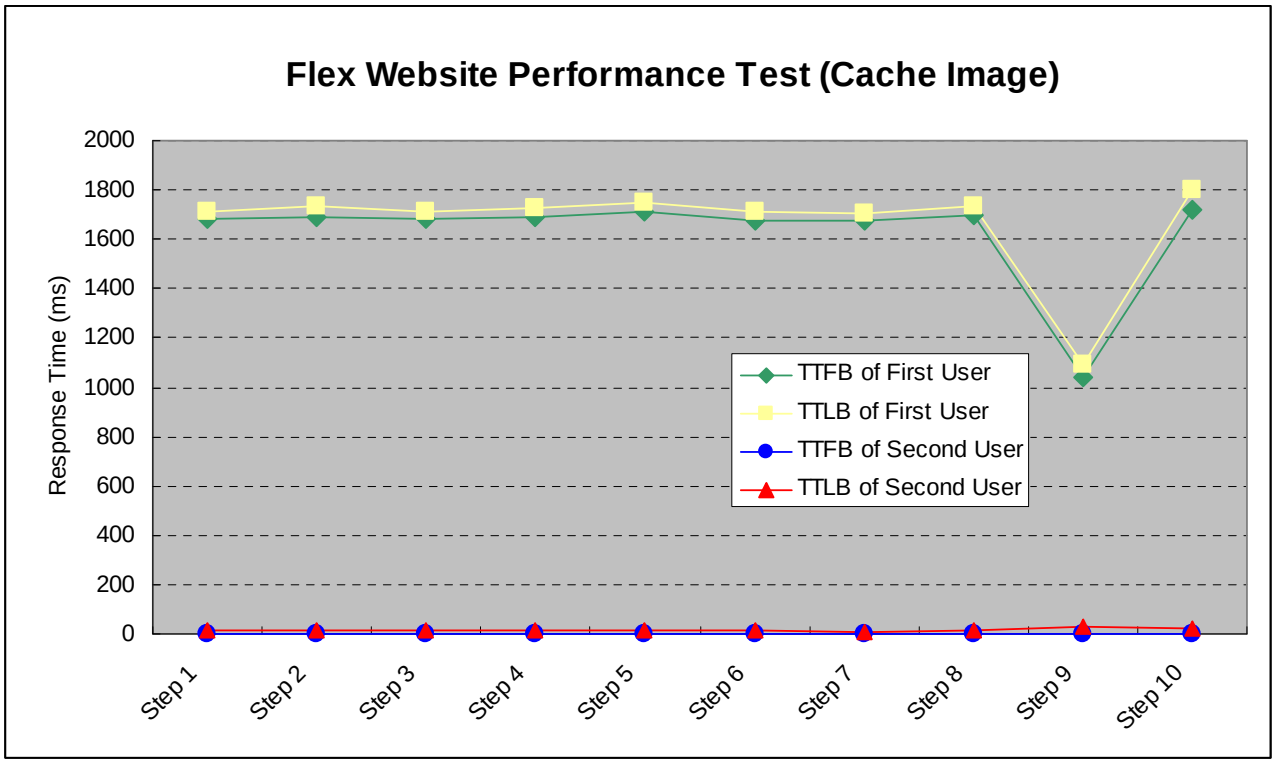
Since both of Flex website and Ultra website utilize ASP.NET objects to operate, we can find that the test results of Flex website are very close to the results of Ultra if in the same testing environment. There might be slight differences in the results that may be caused by the different map extents generated in the testing process.

The chart above shows that if we want the average response time of Flex website to be less than 3.00 seconds, the maximum loading of the website should be between 8 to 10 users browsing the map data. (When 8 users browse the website, the average response time is around 2.550 seconds; when 10 users browse the website, the average response

time is 3.026 seconds.) Therefore, it can be concluded that if we want SuperGIS Server 3 Flex website to perform the best under the test condition, the recommended maximum number of users is around 10.

- Standard 2: In 100.0Mbs local network, we view the Flex website for 10 times to test whether it would be different to display single image (256pix × 256pix) with cache and without cache.

The aim of the test is to know if the first user views the image on the website without any cache, and then the second user views the same image right away, how long the two users spend receiving the responses. Moreover, we applied Stress Tool to record the two users' response time in browsing the website to analyze the performance difference between with and without cache.



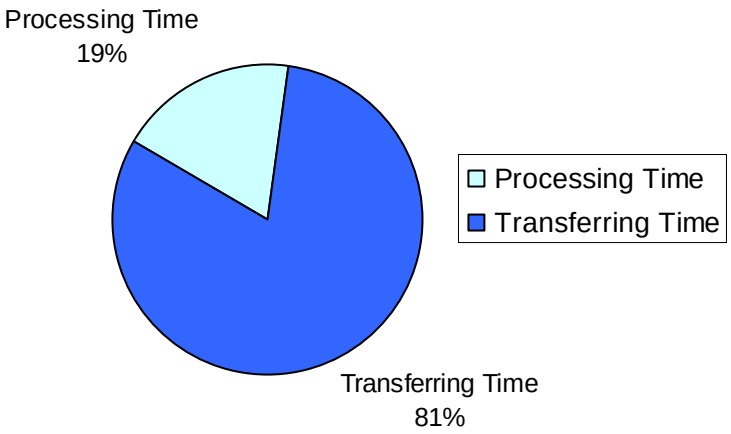
TTFB: The time client side receives the first bit responded by the server

TTLB: The time client side receives the last bit responded by the server.

The map caching mechanism applied in Flex website is the same as Ultra website, so the results of test are very close to the test results of Ultra website. The chart above shows that when the two users browse the same image on the Flex website, the average response time difference between the two users to view a single image is 1.70 seconds at least. If the 24 clip images are displayed together at the same time, the response time difference will be 40.8 seconds at least.

Furthermore, if there is no cached image, it takes much more time to process than transfer during the system response time. Take Step 9 in the figure above for example, when the first user views the Flex website, the server takes 1041.40 milliseconds (TTFB) to process and only takes 47.97 milliseconds (TTLB – TTFB) to transfer. However, when the second user views the Flex website with cached images, the time taken by the server to process is significantly reduced; it takes only 3.35 milliseconds. Transferring cached images is more rapidly than transferring non-cached images; it takes only 12.16 milliseconds to transfer cached images. Therefore, we can find that the website performance can be greatly improved if the Flex website uses cached images.

Processing Time V.S Transferring Time (22 Users)



Moreover, the test results are similar to the results of Ultra website. Transferring images possesses the most of the response time of the website. Like what the chart above indicates, when there are 22 users browsing the website at the same time, the transferring

time taken by the system is nearly 4 times length of the processing time. As a result, it can be concluded that the processing time is much shorter than the transferring time. Also, when the users increase, the time difference between processing images and transferring images will become large as well. The time spent on transferring images is determined by the internet transferring speed and the IIS operation capability.

How to Improve the Website Performance of SuperGIS Server 3

When you apply SuperGIS Server 3 to establish a website providing large size map services, the increased burden of the server may decrease the performance of the website. Therefore, the loading of the website and the response time will be influenced by the website performance. According to the test results described previously, we suggest several ways to improve the performance of SuperGIS Server 3 website. Please refer to the suggestions below and adjust the server environment according to your needs.

- Suggestion 1: Add physical memory to the server.
- Suggestion 2: Increase hard disk space on the server for saving map data.
- Suggestion 3: Use a high-rotation-speed disk.
- Suggestion 4: Establish a loading balance environment and apply resource distribution to improve the processing performance of a website.

Conclusions

Basically, there is no user number limit on the 2 types of websites (Ultra and Flex) provided by SuperGIS Server 3; the performance of the websites depends on the loading of the website server. Therefore, the performance test report contains the test results of the 2 types of websites and provides the suggestions to enable the users who would like to establish the related website services to refer to the associated data provided by us to evaluate and adjust the server environment they needs.

As to the performance of mapping, as long as the website browsing frequency is improved and the cached images are sufficient, the image caching mechanism provided by Ultra and

Flex websites enables enterprises which publish extremely large quantities of map data or map services containing a large number of layers to provide stable browsing performance for front-end users.

The following is the recommended hardware specification for establishing SuperGIS Server 3 websites.

- Minimum specification for server side

Operating system: Windows Server 2003 (32/64 bit) or higher
CPU: Dual core 1.6 GHz or higher
RAM: 1 GB or higher